TRASANA

TECHNICAL REPORT NO. 3-78

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FLIGHT PROFILE PERFORMANCE HANDBOOK

VOLUME V - YAH-64 (ADVANCED ATTACK HELICOPTER-AAH)

Nathan H. Fleck, Jr. Alan T. Wolfe

SEPTEMBER 1978

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DEPARTMENT OF THE ARMY
US ARMY TRADOC SYSTEMS ANALYSIS ACTIVITY
WHITE SANDS MISSILE RANGE
NEW MEXICO 88002

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PREPARED BY

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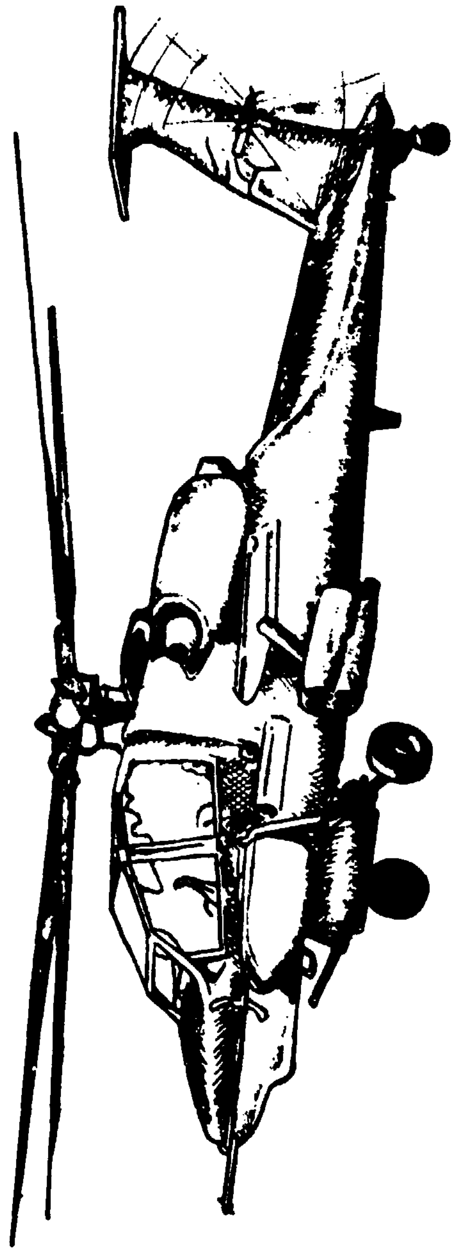

YAH-64

CHAPTER 1

INTRODUCTION

1. PURPOSE

The purpose for preparing this handbook series is fourfold: (a) to validate YAH-64 performance data quickly, (b) to reduce the manpower and time to prepare accurate flight profiles, (c) to standardize performance data so that the analysis community can benefit from a single reference in conducting studies and (d) to provide a handbook that can be used for training in the mission profile planning area.

2. BACKGROUND

The YAH-64 performance data contained in this Flight Profile Performance Handbook (FPPH) series was originally acquired as a data base for the Aircraft Mission Processing Simulation (AMPS) model. AMPS is a computer program developed by the Aviation Systems Analysis Branch of the US Army TRADOC Systems Analysis Activity (TRASANA) to support Cost and Operational Effectiveness Analyses (COEAs). AMPS generates detailed flight profiles for a wide variety of helicopter missions. The data was provided TRASANA by the Army Aviation Research and Development Command (AVRADCOM) and was the most accurate data available to AVRADCOM at the time of handbook publication. In structuring the data base for AMPS it was noted that the data, when properly organized, could provide a method of doing quick and simple flight profile simulations. This volume presents the YAH-64 data and explains how it can be used.

3. OBJECTIVES OF THE HANDBOOK

a. Data Validation. This volume of the handbook contains tables with the precise performance data and format required to develop flight profiles for computer simulations. Using the handbooks as a reference, the individual project manager (PM) will be able to quickly validate or update as required all associated data contained in the different tables. If this procedure is followed by the various PMs, support of Helicopter COEAs and other analyses can be efficiently implemented.

b. Flight Profile Development. Much of the manpower and time spent in preparing flight profiles for supporting aircraft COEAs is dedicated to look-up, correlation and validation of performance data. Once the procedure contained in this handbook is implemented, flight profiles can be easily prepared. What normally took one man 4 to 5 days to prepare can now be prepared in 3 to 4 hours.

c. Standardization of Performance Data. Each of the PMs has been contacted by AVRADCOM to validate the performance data contained in each handbook in this series. Once each handbook is published, the data contained will be kept current as of the publication date. Since the requests for current information are constantly being forwarded to the PMs by analysis groups, this handbook can be a reference and assure a commonality in studies within the community.

d. Training for Planning Missions and Flight Profiles. For training purposes each handbook can stand alone. It is only a matter of following the example provided and applying the proper data to fit the flight profile desired. Although the example shown is simplistic, the methodology may be expanded to apply to any flight profile no matter how complex.

4. OTHER VOLUMES

This handbook is one of a series that covers the helicopters in the US Army inventory. The complete set of handbooks and their subjects are:

Volume I - FPPH Description

Volume II - UH-60A (BLACKHAWK)

Volume III - AH-1G (COBRA)

Volume IV - AH-1S (COBRA)

Volume V - YAH-64 (Advanced Attack Helicopter [AAH])

Volume VI - OH-58C (KIOWA)

Volume VII - CH-47 (CHINOOK)

Volume VIII - CH-54 (TARHE)

Volume IX - UH-1H (HUEY)

5. GENERAL HANDBOOK DESCRIPTION

a. Performance Data. The data contained in these volumes is YAH-64 performance data compiled from the results of actual experiments. It is not engineering data and is not intended to serve as a base for future helicopter construction or acquisition. The more mature the helicopter becomes, the less likely there will be a change in the basic performance data.

b. Handbook Organization. This volume is one of a series of volumes as identified in paragraph 4 above. Volume I is a description of the methodology used to develop the tables for each of the other volumes. This volume and all other volumes except Volume I provides a simplified flight profile example in Chapter 2. Chapter 3 provides an explanation of each of the five types of data tables contained in the handbook. The five types of tables deal with: (1) Basic Fuel Flow Data, (2) Delta Fuel Flow for Drag Data, (3) Ground Idle Fuel Flow Data, (4) Gross Weight Limits Data and, (5) Velocity Limits Data. Chapter 4 contains the actual tables to be used for developing flight profiles.

CHAPTER 2

FLIGHT PROFILE EXAMPLE

1. GENERAL

This chapter provides an example of how to develop a flight profile, albeit simple, that can be extended to cover any number of stops, loads and distances all depending on helicopter capability and fuel available.

2. DISCUSSION

a. The main question this example of a flight profile will answer is, "Do I have enough fuel to fly the proposed mission?"

b. Suppose a pilot is to fly a simple support mission in an YAH-64 helicopter that calls for flying (as shown in illustration 2-1) from point A (the air base), to point B (the holding area) to point C (the combat area) and return to A.

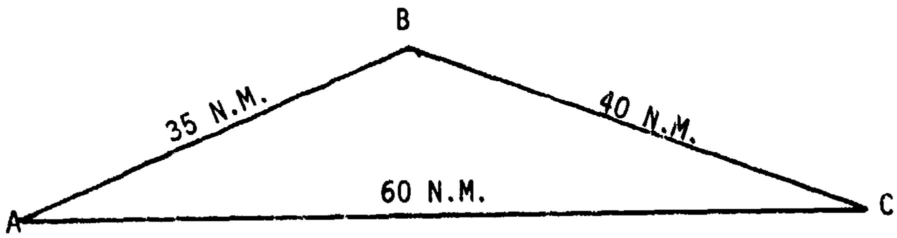

Illustration 2-1

c. The other information given is airspeed (AS) from A to B which is to be 70 knots (kts), from B to C 40 kts, and from C to A 60 kts. The YAH-64 helicopter is to be flown at an ambient temperature of 15°C. The leg from A to B will be flown at 4,000 ft,* while legs B to C and C to A will be at 3,000 ft. The ground elevations at A, B and C are all 2,000 ft. The mission plan also shows 10 minutes idle at A before takeoff, 15 minutes idle at B, 20 minutes Hover in Ground Effect (HIGE) at C and 5 minutes idle on returning to A for shut-down. The YAH-64 will take off with a gross weight (GW) of 17,500 lbs at A and continue to carry this weight until leaving C to return to A, then the GW will be 16,000 lbs.

All altitudes are in reference to sea level.

d. The flight plan is prepared by drawing up a table similar to Table 2-1 below. By filling in the blanks under fuel, it can be determined if the total is too large for the helicopter.

TABLE 2-1

Helicopter: YAH-64

Temperature: 15°C

LEG	DISTANCE N.M.	AS KTS	TIME MIN	HR	GW LBS	ALT FT	FUEL LBS
Idle @ A	-	-	10	1/6	-	2000	
A - B	35	70	30	1/2	17,500	4000	
Idle @ B	-	-	15	1/4	-	2000	
B - C	40	40	60	1	17,500	3000	
HIGE @ C	-	-	20	1/3	17,500	2000	
C - A	60	60	60	1	16,000	3000	
Idle @ A	-	-	5	1/12	-	2000	
						Total	

e. First fill in Idle @ A, Idle @ B, and 2nd Idle @ A since they will all come from Table 2-2. In each case the idle is at 2000 ft and a temperature of 15°C. Consulting the ground idle fuel shown in Table 2-2, the value of 474 lbs/hr is at the intersection of 2000 ft and 15°C.

1st Idle @ A = 1/6 X 474 = 79 lbs

Idle @ B = 1/4 X 474 = 119 lbs

2nd Idle @ A = 1/12 X 474 = 40 lbs

TABLE 2-2

GROUND IDLE FUEL FLOW

AIRCRAFT - YAH-64

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	473	440	409	379	351	325
	-5 C	492	458	424	391	365	338
	15 C	510	474	440	409	379	350
	35 C	527	490	454	422	392	362

ENTRIES ARE AIRCRAFT FUEL FLOW RATES IN LBS/HR

TABLE 2-3

[illegible]SIC FUEL FLO[illegible]

FUEL FLOW R[illegible] THE GIVEN CONDITIONS I[illegible] LBS/HR

PRESSU[illegible] 4000 FT TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	686	75[illegible]	707	649	592	580	625	699	6[illegible]	1035
11,500	753	84[illegible]	766	687	622	610	648	716	6[illegible]	1065
13,000	854	933	832	731	658	647	675	742	8[illegible]	1100
14,500	916	1032	906	77[illegible]	702	688	708	772	8[illegible]	1132
16,000	1004	114[illegible]	989	838	755	731	749	810	9[illegible]	1222
17,500	1106	1260	1083	906	815	781	797	856	99[illegible]	1464
19,000	1222	1410	1201	992	879	835	853	921	1113	1999

TABLE 2-4

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	703	785	733	681	625	611	662	746	874	1107
11,500	771	863	790	717	652	639	684	762	889	1147
13,000	849	945	851	757	684	671	709	782	909	1162
14,500	944	1036	919	803	723	710	738	809	932	1196
16,000	1005	1139	996	853	769	751	772	841	963	1232
17,500	1099	1250	1081	911	823	796	814	880	1005	1347
19,000	1202	1371	1177	984	884	847	863	929	1075	1611

Notice the conversion from minutes to hours. These values must be used because fuel flow is in lbs/hr.

f. The fuel flow for leg A-B of the mission is calculated next. This leg takes place at an altitude of 4,000 ft. and a temperature of 15°C. Thus the necessary information is contained in Table 2-3. Leg A-B is at 70 kts and 17,500 lbs. This is not one of the values given but 60 kts is 815 lb/hr and 80 kts is 781 lb/hr. Interpolation gives the value of 798 lb/hr for a 70 kts airspeed. Since the leg is a half hour long:

Leg A-B = 1/2 X 798 = 399 lbs

g. Leg B-C is calculated next. Since this takes place at a 3,000 ft. altitude, it is necessary to interpolate between Table 2-3 (4,000 ft) and Table 2-4 (2,000 ft). From Table 2-3 the value for 4,000 ft, 15°C, 40 kts and 17,500 lbs is 906 lb/hr. From Table 2-4 the value for 2,000 ft, 15°C, 40 kts and 17,500 lbs is 911 lb/hr. Interpolation gives the value of 909 lb/hr for a 3,000 ft altitude. Since the leg is one hour long:

Leg B-C = 1 X 909 = 909 lbs

h. HIGE at C is calculated next. Since this occurs at 2,000 ft and 15°C the necessary value is found in Table 2-4. At 17,500 lbs, HIGE uses 1099 lb/hr of fuel. Since the hover is one-third of an hour long:

HIGE @ C = 1/3 X 1099 = 366 lbs

i. Leg C-A is the last calculation. Since it takes place at a 3,000 ft altitude, it is once again necessary to interpolate between values from Table 2-3 and Table 2-4. Table 2-3 gives a rate of 755 lb/hr for 4,000 ft, 15°C, 16,000 lbs and 60 kts. Table 2-4 gives a rate of 769 lb/hr for 2,000 ft, 15°C, 16,000 lbs and 60 kts. By interpolation, 762 lb/hr is the value needed. Since the leg is one hour long:

Leg C-A = 1 X 762 = 762 lbs

j. The flight profile can be finished by filling in Table 2-1 as shown in Table 2-5.

TABLE 2-5

Helicopter: YAH-64

Temperature: 15°C

LEG	DISTANCE N.M.	AS KTS	TIME MIN	HR	GW LBS	ALT FT	FUEL LBS
Idle @ A	-	-	10	1/6	-	2000	79
A - B	35	70	30	1/2	17,500	4000	399
Idle @ B	-	-	15	1/4	-	2000	119
B - C	40	40	60	1	17,500	3000	909
HIGE @ C	-	-	20	1/3	17,500	2000	366
C - A	60	60	60	1	16,000	3000	762
Idle @ A	-	-	5	1/12	-	2000	40
						Total	2674

k. Although only three look-up tables were used for this example, each type of table has several conditions that are changed so that a wide band of performance parameters can be addressed. The discussion on each of the five types of tables is contained in Chapter 3. A succinct description of each of these five types of tables is:

(1) Basic Fuel Flow Data: Gives the rate the aircraft uses fuel dependent on the given flight conditions.

(2) Delta Fuel Flow for Drag Data: Gives the additional rate of fuel flow to be added to the basic rate for external drag.

(3) Ground Idle Fuel Flow Data: Gives the rate fuel is used when the aircraft is on the ground with its engine running.

(4) Gross Weight Limits Data: A check on whether or not the aircraft has enough lift to take off with a given weight.

(5) Velocity Limits Data gives the optimum (long range) speed and maximum rates of speed.

CHAPTER 3

PERFORMANCE DATA TABLE DESCRIPTIONS

1. GENERAL

This chapter describes each of the five basic type tables used for developing flight profiles. The variables within each type of table are described as well as how the specific data required can be extracted.

2. BASIC FUEL FLOW DATA

a. The basic rate of fuel flow* is determined by five variables:

(1) Type of aircraft

(2) Altitude (Air Pressure)**

(3) Temperature***

(4) Gross Weight****

(5) Flight Mode

b. In each table (see Table 3-1) within the basic type, the first three variables are held constant for the whole table, i.e., (a) Type of Aircraft, (b) Altitude (Air Pressure) above sea level, and (c) Temperature. These variables are stated at the top of each table.

c. There are seven rows of fixed gross weights: 10,000 lbs to 19,000 lbs inclusive at 1,500 lb increments. The ten columns are fixed flight modes.

(1) The first column is Hover In Ground Effect (HIGE). HIGE is used for hovers at a height of 2 feet or less and a component of forward flight 10 kts or less.

(2) The second column is Hover Out of Ground Effect (HOGE). This is used for hovers at a height of more than 2 feet.

---

*The basic fuel flow data represents a clean drag configuration with all doors closed, no wing stores, and no external sling loads.

**All altitudes or air pressures are feet above sea level.

***For simplicity, all temperatures are considered to be the average temperature in which the helicopter is operating (Degrees Centigrade).

****Total vehicle weight in pounds.

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(3) The third column is Nap of the Earth (NOE). This is defined as all flight for variable speeds from 0 to 40 kts and variable altitudes.

(4) The remaining seven columns are for given airspeeds* (in kts) as the flight mode.

d. There are 24 of these basic fuel flow charts. Each chart is for a different combination of Air Pressure (Altitude) and temperature.

e. The Basic Fuel Flow Data is the main table used in simulating a flight profile. For example, assume a pilot's flight path will require 30 minutes of flight at 80 kts airspeed, 4000 ft. altitude, 15°C and a gross weight of 16,000 lbs in a YAH-64 helicopter. Using Table 3-1 at a gross weight of 16,000 lbs and an airspeed of 80 kts, the helicopter will use 731 lbs/hr fuel, i.e., for 30 minutes, 366 lbs of fuel will be used.

f. The gross weights values selected provide the basic range of load carrying capability for the ten flight modes of the YAH-64 helicopter. Within the gross weight band shown, linear interpolation** is quite accurate for estimating the fuel flow rates.

g. For example, using Table 3-1, if the helicopter's gross weight was 15,000 lbs and if the flight mode was 60 kts, the fuel flow cannot be found directly. But by interpolating between 60 kts, 14,500 lbs - 702 lbs/hr and 16,000 lbs - 755 lbs/hr, the basic fuel flow rate for 15,000 lbs is 720 lbs/hr. In this example, if the helicopter flies in this mode for 30 minutes, 360 lbs of fuel will be used.

h. As altitude and/or temperature changes occur, different tables are used to look up the aircraft's basic fuel flow rate for each leg of the flight path. Care must be taken that the proper table is used.

i. Appendix A contains a set of functions that will give a good approximation of the basic rate of fuel flow.

3. DELTA FUEL FLOW FOR DRAG DATA

a. The delta fuel flow for drag is also determined by five variables:

(1) Type of Aircraft

(2) Altitude (Air Pressure)

(3) Temperature

(4) Drag Surface (Equivalent Square Footage)

(5) Air Speed

**All references to airspeeds are to true airspeeds.*

***All references to interpolation are linear interpolations. See FPPH, Volume I, Chapter 3 for a discussion on the accuracy of interpolation.*

TABLE 3-1

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	686	766	707	649	592	560	625	699	816	1035
11,500	753	845	766	687	622	610	648	716	836	1065
13,000	854	933	832	731	658	647	675	742	858	1100
14,500	916	1032	906	779	702	688	708	774	880	1132
16,000	1004	1142	989	838	755	731	749	810	926	1222
17,500	1106	1260	1083	906	815	781	797	856	990	1464
19,000	1222	1410	1201	992	879	835	853	921	1113	1999

TABLE 3-2

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	7	15	27	42	71
	10.0	2	6	14	29	53	84	144

b. Like the basic fuel flow tables, there are 24 tables for delta fuel flow for drag.

c. There are two fixed rows of equivalent square feet of drag: 5.0 equivalent sq ft and 10.0 equivalent sq ft.

d. The seven columns are for airspeeds in kts of: 40 kts, 60 kts, 80 kts, 100 kts, 120 kts, 140 kts, and 160 kts.

e. When an external load is placed on the helicopter, the amount of fuel consumed per hour increases. The delta fuel flow for drag tables indicate how much extra fuel consumption to add to the basic fuel flow rate.

f. In the example given earlier, a 30 minute flight at 80 kts airspeed, 4000 ft altitude, 15°C and a gross weight of 16,000 lbs was used. Using the basic fuel flow tables, the basic fuel flow rate was 731 lbs/hr. Assuming for this new example that part of the load is external and inducing a 5.0 equivalent sq ft external drag, the delta fuel flow for drag (Table 3-2) shows 7 lbs/hr should be added to the basic fuel flow rate. Thus the basic fuel flow rate becomes 731 + 7 or 738 lbs per hour and for a half-hour flight, 369 lbs of fuel will be used instead of the 366 lbs figured without an external load.

g. Appendix B contains a function that will give a good approximation of the delta fuel flow for drag.

4. GROUND IDLE FUEL FLOW DATA

a. The ground idle fuel flow rate is determined by only three variables:

(1) Type of Aircraft

(2) Altitude (Air Pressure)

(3) Temperature

b. There is only one ground idle fuel flow table (shown as Table 2-2). The table has four rows of temperatures: -25°C, -5°C, 15°C and 35°C, and six columns of altitudes: Sea Level, 2000 ft, 4000 ft., 6000 ft., 8000 ft., and 10000 ft.

c. The ground idle fuel flow table is used as discussed in the example flight profile in Chapter 2 (Table 2-2). The YAH-64 helicopter idling for 20 minutes at 2000 ft. altitude and 15°C, (across the row labeled 15°C and down the column labeled 2000) find the intersection at 474. Thus, the YAH-64 uses 474 lbs/hr at these conditions and since it is idling for 20 minutes or 1/3 of an hour, it will use 158 lbs of fuel.

d. If the helicopter had only been 1000 ft. above sea level, the consumption rate would be found by interpolating between the sea level rate of 510 lbs/hr and the 2000 ft. rate of 474 lbs/hr which would be 492 lbs/hr. In 1/3 of an hour 164 lbs of fuel would be used.

e. Appendix C contains a function that will give a good approximation of the ground idle fuel flow.

GROSS WEIGHT LIMITS DATA

a. Gross weight limits tables are intended to show whether or not the aircraft can safely take off for four sets of criteria. These criteria are defined in the following paragraphs:

(1) Criteria #1 is based on the helicopter using 100% of Maximum Power for take off and having enough power to lift straight up and above ground effect (See Figure 3-1). Once it is in hovering above ground effect level the helicopter begins forward flight until it acquires transitional lift and is able to climb at 450 ft/min (a desired standard rate of climb) to the desired altitude. This criteria has some risk since the pilot has no reserve power. It has less risk than Criteria #3 but more than Criteria #2 thus it is considered to be "Middle of the Road" risk.

(2) Criteria #2 (Figure 3-1) is based on the helicopter using 95% of Maximum Power for take off and enough power to immediately begin to climb at a rate of 450 ft/min. This is the least risky criteria since the pilot has power in reserve and is still able to climb at a satisfactory rate.

(3) Criteria #3 (Figure 3-1) has the most risk. Using 100% of Maximum Power the helicopter will only hover in ground effect. Therefore, at an altitude of 2 feet or less, the pilot must begin forward flight and gradually increase airspeed to acquire transitional lift to climb. The reasons for its high risk are readily apparent. First, there is no power in reserve. Second, the pilot must begin forward flight at a very low altitude.

(4) Criteria #4. Structural Gross Weight Limits is the total upper limit of gross weight the helicopter can carry under any take off criteria.

b. Gross Weight Limits are determined by four variables:

(1) Type of Aircraft

(2) Criteria Chosen

(3) Altitude (Air Pressure)

(4) Temperature

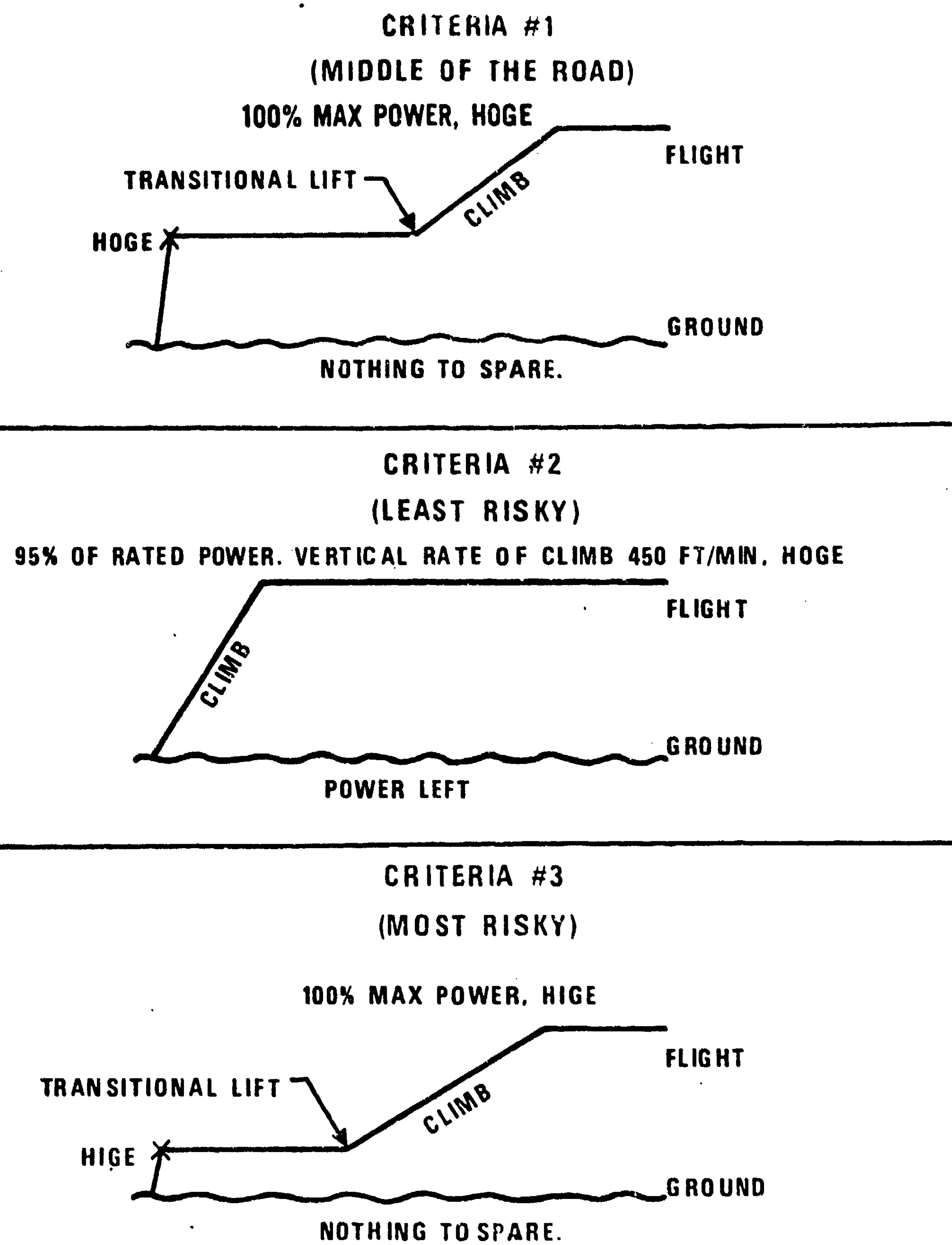
CRITERIA #1
(MIDDLE OF THE ROAD)
100% MAX POWER, HOGE
FLIGHT
TRANSITIONAL LIFT
CLIMB
HOGE
GROUND
NOTHING TO SPARE.
CRITERIA #2
(LEAST RISKY)
95% OF RATED POWER. VERTICAL RATE OF CLIMB 450 FT/MIN. HOGE
FLIGHT
CLIMB
GROUND
POWER LEFT
CRITERIA #3
(MOST RISKY)
100% MAX POWER, HIGE
FLIGHT
TRANSITIONAL LIFT
CLIMB
HIGE
GROUND
NOTHING TO SPARE.

Figure 3-1

c. Additionally, criteria #1, #2, and #3 differ due to engine power limits or transmission power limits of the aircraft. Thus there are six tables:

(1) Criteria #1 (Due to engine)

(2) Criteria #1 (Due to transmission)

(3) Criteria #2 (Due to engine)

(4) Criteria #2 (Due to transmission)

(5) Criteria #3 (Due to engine)

(6) Criteria #3 (Due to transmission)

d. The structural gross weight limit is a single value for each helicopter and is only dependent on the type helicopter. The YAH-64 structural gross weight limit is given as 17,650 lbs and is listed at the bottom of each table. As the name implies, it is simply <u>not</u> safe to expect the YAH-64 structure to maneuver normally when the total weight is larger than that value.

e. In simulating inflight profile, the gross weight limits tables are used to check whether the aircraft is going to be too heavy to take off under the given conditions. As an example, assume an YAH-64 pilot planned a mission that called for using take off criteria #1 and the take off was to be at 6000 ft., 15°C, and a gross weight of 16,300. Three checks would be required: First, does this gross weight exceed the structural gross weight limit? Second, does it exceed Criteria #1 (due to transmission)? Third, does it exceed Criteria #1 (due to engine)? In the example given, the answer to all three questions is "No", the take off will not exceed aircraft limits. (Tables 3-3 and 3-4)

f. If the assigned gross weight had been 16,400 lbs, it would have exceeded the value given for 6,000 ft. and 15°C at Criteria #1 (Due to engine). (Table 3-3) The mission could not be flown as planned. The plan could be changed, for example to take off at 4000 ft. (which might not be practical) or change to take off Criteria #3 (which is more risky but has higher limits).

g. If the assigned gross weight had been 17,800 lbs., it would have exceeded the structural limits. To perform the mission the only choices would be to lighten the load or get another type helicopter.

h. Appendix D contains a set of functions that will give a good approximation of the gross weight limits for takeoff.

TABLE 3-3

GROSS WEIGHT LIMITS

(DUE TO ENGINE)

FOR TAKEOFF CRITERIA #1

100% OF MAXIMUM POWER (HOGE)

AIRCRAFT - YAH-64

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	21985	20471	19010	17662	16372	15185
	-5 C	21674	20575	19142	17794	16500	15241
	15 C	20289	18931	17601	16346	15106	13947
	35 C	17961	16746	15527	14357	13197	12106

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 17,650 LBS

TABLE 3-4

GROSS WEIGHT LIMITS

(DUE TO TRANSMISSION)

FOR TAKEOFF CRITERIA #1

100% OF MAXIMUM POWER (HOGE)

AIRCRAFT - YAH-64

TEMPERATURE DEGREES CENTIGRADE		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
	-25 C	19551	19216	18886	18538	18131	17655
	-5 C	19196	18870	18526	18125	176[illegible]5	17146
	15 C	18874	18536	18143	17682	17182	16807
	35 C	18564	18181	17733	17241	16735	16194

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 17,650 LBS

6. VELOCITY LIMITS DATA

a. There are various types of data given in these tables but like the gross weight limits tables, they are primarily restraints on what can be expected of a helicopter in planning a mission profile. Velocity limits tables are influenced by five variables:

(1) Type of aircraft

(2) Air pressure (altitude)

(3) Temperature

(4) Gross weight

(5) Condition or limit

b. Items (1) through (4) are self-explanatory. There are five types of information that can be listed under (5):

(1) Long range

(2) Maximum continuous power

(3) Maximum power (due to engine limits)

(4) Transmission limits

(5) V_{ne} (velocity never exceed)

c. For each aircraft, there are 24 Velocity Limits Tables depending on air pressure and temperature combination. Table 3-5 is an example of the content of the Velocity Limits Table.

d. The two columns under Long Range (Table 3-5) give the optimum speed and fuel flow for each set of variables #1 through #4 above. Thus the YAH-64 helicopter operating at 2000 ft., temperature 15°C, and having a gross weight of 16,000 lbs will fly a longer distance if the velocity is kept at 143 kts and will use 997 lbs/hr of fuel at that velocity.

e. Maximum continuous power gives the fastest speed at which a helicopter can fly for long periods (30 minutes or more) and the associated fuel flow rate. An example from Table 3-5 would be an YAH-64 helicopter at 2000 ft. and 15°C weighing 16,000 lbs could fly 156 kts with a fuel usage of 1152 lbs/hr.

TABLE 3-5

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	139	867	163	1152	177	1365	175	1331
11,500	141	897	161	1152	175	1365	173	1331
13,000	142	927	159	1152	172	1365	170	1331
14,500	143	964	158	1152	170	1365	168	1331
16,000	143	997	156	1152	168	1365	166	1331
17,500	144	1042	153	1152	160	1365	160	1331
19,000	140	1073	147	1152	157	1365	156	1331

f. Maximum power (engine and transmission limits) show the maximum speeds the aircraft can structurally attain for short periods of time (less than 30 minutes). Thus the YAH-64 helicopter at 2000 ft and 15°C weighing 16,000 lbs has an engine that is capable of producing enough power to fly 168 kts but the transmission limits the aircraft to 166 kts. Between these two columns then, the flight cannot exceed 166 kts with a fuel flow rate of 1331 lbs/hr.

g. There is another limiting factor called V_{ne} (velocity never exceed). This velocity limit is determined by helicopter structural considerations. V_{ne}'s for YAH-64 have not yet been determined. When they are, they will be included in later editions of this volume.

7. DETAILED FLIGHT PROFILE USING ALL PERFORMANCE DATA TABLES

The example of a Flight Profile in Chapter 2 was intentionally simplified to assure clarity. The description of the various tables in this handbook, however, indicates a more complex set of considerations are normally encountered in developing the flight profile. With the description provided in this chapter, additional information should be included in the flight plan beyond that shown in the example and a suggested format is provided below in Table 3-6.

TABLE 3-6

Helicopter:
Altitude:
Temperature:

LEG	DISTANCE	AS	CHECK VELOCITY LIMIT	TIME	GW (LBS)	DRAG	FUEL

Needed for each take off:
Weight at take off:
Type of take off:
Check transmission limits:
Check engine limits:
Check structural gross weight limit:

CHAPTER 4

AAH (YAH-64) PERFORMANCE DATA TABLES

GENERAL

The following tables are the major information presented in this handbook. If the procedure for using them is understood, a flight profile for the AAH (YAH-64) helicopter can be prepared in a matter of a few hours. The performance data contained have been reviewed for accuracy and are corrected to the best of our knowledge. The tables are organized in the following manner:

Tables 4-1 to 4-24	Basic Fuel Flow Data
Tables 4-25 to 4-48	Delta Fuel Flow for Drag Data
Table 4-49	Ground Idle Fuel Flow Data
Tables 4-50 to 4-55	Gross Weight Limits Data
Tables 4-56 to 4-79	Velocity Limits Data

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BASIC FUEL FLOW DATA

TABLES

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TABLE 4-1

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	676	781	742	704	656	637	715	844	1022	1361
11,500	743	847	793	738	675	658	735	858	1036	1400
13,000	816	920	847	775	700	686	758	874	1052	1426
14,500	862	1000	906	813	729	717	784	893	1078	1471
16,000	958	1088	971	854	765	752	812	917	1110	1533
17,500	1069	1186	1042	899	804	794	842	945	1146	1599
19,000	1138	1290	1119	947	849	838	877	978	1190	1664

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TABLE 4-2

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL   TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	700	794	751	709	657	638	705	815	969	1264
11.500	768	865	804	743	678	663	725	828	981	1272
13.000	838	941	860	780	705	691	746	845	997	1293
14.500	907	1022	921	820	737	723	774	866	1018	1334
16.000	1011	1114	989	864	775	761	803	891	1043	1378
17.500	1081	1215	1063	912	818	804	836	921	1074	1421
19.000	1157	1325	1144	964	868	847	875	956	1114	1467

TABLE 4-3

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	722	808	762	715	601	644	702	795	934	1187
11,500	791	883	816	750	685	671	722	809	947	1198
13,000	856	962	874	787	714	700	745	827	964	1226
14,500	951	1046	938	829	748	734	772	850	985	1262
16,000	1030	1141	1009	876	789	775	802	878	1010	1294
17,500	1097	1246	1087	927	837	816	836	911	1043	1347
19,000	1194	1358	1173	988	894	862	881	952	1068	1472

TABLE 4-4

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	743	824	773	722	668	653	702	781	902	1119
11,500	809	901	829	758	693	680	722	794	914	1133
13,000	865	983	890	796	725	711	745	813	931	1160
14,500	982	1070	956	841	762	748	772	836	951	1187
16,000	1041	1168	1029	890	806	787	804	864	977	1213
17,500	1130	1275	1112	949	859	830	843	901	1013	1308
19,000	1228	1392	1206	1019	919	879	889	947	1070	1523

TABEL 4-5

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	659	756	713	670	618	601	673	791	956	1293
11.500	730	825	766	706	640	627	695	806	971	1313
13.000	800	903	823	743	666	656	720	824	993	1351
14.500	868	986	886	784	702	690	747	846	1023	1409
16.000	975	1084	956	827	740	730	777	873	1058	1475
17.500	1052	1188	1031	875	784	774	812	905	1101	1540
19.000	1126	1301	1115	929	834	818	851	946	1154	1632

TABLE 4-6

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	682	770	722	675	620	604	665	764	906	1178
11.500	753	845	778	710	644	631	686	779	920	1192
13.000	819	923	836	749	675	661	711	798	940	1226
14.500	913	1012	902	792	710	698	739	822	963	1270
16.000	995	1111	975	839	752	740	771	850	992	1313
17.500	1066	1219	1055	890	801	783	809	885	1030	1372
19.000	1166	1335	1143	952	857	829	852	928	1083	1538

TABLE 4-7

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	703	785	733	681	625	611	662	746	874	1107
11.500	771	863	790	717	652	639	684	762	889	1147
13.000	849	945	851	757	684	671	709	782	909	1162
14.500	944	1036	919	803	723	710	738	809	932	1196
16.000	1005	1139	996	853	769	751	772	841	963	1232
17.500	1099	1250	1081	911	823	796	814	880	1005	1347
19.000	1202	1371	1177	984	884	847	863	929	1075	1611

TABLE 4-8

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	723	801	745	688	632	619	662	732	844	1044
11.500	788	881	803	725	661	648	684	746	859	1067
13.000	889	966	867	767	696	683	709	769	877	1095
14.500	951	1060	936	815	738	722	739	796	901	1119
16.000	1034	1166	1018	871	788	763	776	830	934	1190
17.500	1131	1281	1110	939	848	811	821	875	986	1367
19.000	1243	1414	1218	1020	911	864	875	931	1092	1773

TABLE 4-9

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	645	735	667	639	584	570	635	741	895	1210
11.500	717	809	742	676	609	598	659	758	912	1237
13.000	782	890	803	715	641	630	685	776	940	1289
14.500	878	983	870	756	678	668	714	804	974	1354
16.000	967	1085	945	804	721	712	748	835	1015	1420
17.500	1038	1197	1027	857	769	756	786	874	1066	1503
19.000	1141	1325	1124	923	826	803	831	927	1130	1747

TABLE 4-10

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	667	750	697	643	587	574	627	716	847	1099
11.500	735	827	754	680	614	602	650	733	865	1123
13.000	814	911	816	722	648	636	677	756	887	1166
14.500	910	1007	867	768	668	677	708	783	914	1210
16.000	975	1114	965	817	735	720	744	815	950	1260
17.500	1073	1228	1053	877	770	766	787	857	1000	1406
19.000	1179	1361	1158	954	851	816	836	911	1082	1728

TABLE 4-11

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	686	766	707	649	592	560	625	699	818	1035
11,500	753	845	766	687	622	610	648	718	836	1065
13,000	854	933	832	731	658	647	675	742	858	1100
14,500	916	1032	906	779	702	688	708	772	886	1132
16,000	1004	1142	989	836	755	731	749	810	926	1242
17,500	1106	1260	1083	906	815	781	797	858	990	1464
19,000	1222	1410	1201	992	879	835	853	921	1113	1999

TABLE 4-12

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	702	762	719	656	600	588	625	687	790	979
11.500	784	864	780	695	[illegible]32	620	648	706	807	1007
13.000	866	954	845	741	671	658	676	730	829	1032
14.500	937	1057	925	794	719	699	711	762	859	1078
16.000	1033	1169	1015	860	777	745	755	805	905	1247
17.500	1142	1301	1120	939	840	797	807	858	1001	1590
19.000	1291	1468	1252	1036	906	853	874	951	1160	2784

TABLE 4-13

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	633	716	663	610	553	542	601	695	838	1133
11,500	702	794	721	648	582	572	626	714	861	1174
13,000	780	863	766	690	617	607	654	736	893	1236
14,500	882	983	859	735	658	650	686	767	931	1302
16,000	949	1092	939	786	706	694	723	804	980	1376
17,500	1050	1217	1034	850	761	740	767	855	1043	1573
19,000	1162	1361	1146	930	826	793	821	919	1140	2010

TABLE 4-14

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT   TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	653	732	673	614	557	546	593	672	794	1028
11.500	720	812	733	654	586	576	618	692	814	1065
13.000	821	904	801	698	625	615	647	717	839	1109
14.500	886	1008	877	746	671	658	682	748	872	1154
16.000	980	1121	962	803	724	703	723	786	919	1270
17.500	1084	1250	1064	878	784	753	771	840	995	1566
19.000	1209	1415	1192	969	852	809	830	910	1134	2224

TABLE 4-15

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	668	748	604	620	563	552	590	657	767	973
11.500	754	831	746	661	597	585	616	679	788	1008
13.000	832	926	617	708	637	625	647	707	813	1040
14.500	909	1033	897	761	667	668	685	742	849	1102
16.000	1009	1149	969	828	746	717	731	788	905	1310
17.500	1123	1294	1103	912	810	770	786	846	1020	1774
19.000	1287	1478	1247	1017	862	828	859	957	1198	[illegible]

TABLE 4-16

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	60	100	120	140	160
10,000	684	764	695	627	572	560	591	646	741	921
11,500	782	850	760	670	607	596	616	668	760	949
13,000	843	948	834	720	652	636	648	696	737	978
14,500	936	1056	920	782	707	680	690	736	826	1106
16,000	1041	1184	1021	857	769	731	740	787	939	1398
17,500	1184	1347	1149	952	836	787	804	872	1061	2437
19,000	1367	1556	1313	1070	913	847	890	1013	1278	4158

TABLE 4-17

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	622	701	642	584	526	516	568	653	787	1067
11.500	689	784	704	624	558	549	595	674	815	1122
13.000	794	861	774	668	597	590	626	702	851	1188
14.500	862	987	852	717	643	634	661	736	897	1255
16.000	958	1109	943	777	697	679	704	784	956	1414
17.500	1066	1250	1053	856	760	731	757	847	1047	1826
19.000	1205	1439	1195	950	832	791	821	930	1220	2511

TABLE 4-18

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT   TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	637	717	652	586	530	520	561	632	745	969
11,500	724	803	717	630	565	555	588	655	768	1012
13,000	803	903	790	677	607	597	621	684	798	1055
14,500	886	1013	872	731	659	641	660	721	840	1138
16,000	989	1138	970	802	718	690	707	770	908	1394
17,500	1110	1298	1094	891	764	745	765	837	1039	1992
19,000	1291	1511	1255	1000	862	807	845	957	1253	3440

TABLE 4-19

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	654	733	663	594	536	527	559	619	721	919
11.500	750	822	730	638	575	565	587	644	743	953
13,000	815	926	807	689	621	606	623	677	775	993
14.500	913	1039	895	752	678	653	667	720	823	1153
16,000	1022	1175	1004	832	741	706	719	775	924	1535
17.500	1179	1355	1144	934	812	763	790	876	1095	2798
19.000	1383	1609	1333	1058	895	829	886	1033	1364	4518

TABLE 4-20

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10,000	683	749	675	601	546	536	559	608	696	868
11,500	756	841	745	648	587	574	588	634	718	892
13,000	839	948	826	705	638	616	626	669	752	972
14,500	940	1067	922	777	699	666	674	717	818	1210
16,000	1074	1222	1045	867	764	721	735	792	958	2023
17,500	1251	1443	1203	983	840	760	818	928	1165	3745
19,000	1510	1634	1379	1124	939	851	936	1114	1549	5030

TABLE 4-22

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	603	689	624	560	502	493	539	614	742	1012
11.500	696	780	691	602	538	530	566	639	774	1076
13.000	780	883	766	649	582	574	601	671	816	1141
14.500	865	1000	853	705	633	619	642	714	871	1258
16.000	973	1137	959	781	695	669	693	775	953	1624
17.500	1106	1318	1096	874	766	729	756	855	1117	2207
19.000	1310	1576	1282	989	848	796	844	992	1399	2742

TABLE 4-22

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT   TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	625	705	635	564	507	498	532	596	701	918
11.500	722	799	704	610	546	537	562	622	727	962
13.000	792	906	763	660	594	581	600	656	764	1016
14.500	893	1025	876	726	652	628	645	701	822	1220
16.000	1008	1177	995	812	717	682	699	764	940	1730
17.500	1184	1384	1151	918	793	743	777	877	1144	3074
19.000	1423	1688	1370	1052	881	815	881	1051	1492	4792

TABLE 4-23

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	656	721	646	571	515	506	531	585	677	668
11.500	727	819	719	619	557	546	563	614	705	900
13.000	817	929	803	676	611	591	604	653	745	1004
14.500	922	1056	904	752	673	642	654	704	828	1307
16.000	1068	1229	1039	850	741	699	720	794	967	2359
17.500	1266	1469	1220	971	824	763	814	946	1243	4097
19.000	1583	1701	1415	1129	919	842	950	1169	1762	5402

TABLE 4-24

BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT   TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HOGE	NOE	40	60	80	100	120	140	160
10.000	677	736	658	579	525	515	531	575	654	816
11.500	744	838	734	631	571	555	565	606	683	856
13.000	840	952	825	697	629	602	609	64[illegible]	732	1036
14.500	961	1095	939	782	693	656	666	[illegible]	852	1561
16.000	1131	1286	1090	893	767	714	745	83[illegible]	1045	3254
17.500	1376	1503	1267	1031	855	783	859	1017	1400	4591
19.000	1561	1682	1450	1218	956	861	1059	1353	2223	5921

DELTA FUEL FLOW FOR DRAG DATA

TABLES

TABLE 4-25

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: SEA LEVEL   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

DRAG IN SQUARE FEET		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
	5.0	1	4	10	20	36	62	109
	10.0	3	9	20	41	71	125	225

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TABLE 4-26

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: SEA LEVEL   TEMPERATURE: -5 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	9	18	33	53	91
	10.0	2	8	18	37	66	109	185

TABLE 4-27

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: SEA LEVEL   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	8	17	31	48	82
	10.0	2	7	17	33	62	97	166

TABLE 4-28

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: SEA LEVEL TEMPERATURE: 35 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	8	15	28	46	73
	10.0	2	7	15	31	56	91	149

TABLE 4-29

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 2000 FT   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

DRAG IN SQUARE FEET	AIR SPEED IN KTS						
	40	60	80	100	120	140	160
5.0	1	4	9	19	33	57	102
10.0	2	8	18	38	66	116	210

TABLE 4-30

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 2000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	8	17	31	50	84
	10.0	2	7	17	34	62	101	172

TABLE 4-31

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 2000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	8	16	29	45	76
	10.0	2	7	15	31	57	91	154

TABLE 4-32

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 2000 FT   TEMPERATURE: 35 C

AIRCRAFT - YAH-64

DRAG IN SQUARE FEET		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
	5.0	1	3	7	14	26	43	60
	10.0	2	6	14	29	53	85	134

TABLE 4-33

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	9	18	31	54	95
	10.0	2	7	17	36	61	109	196

TABLE 4-34

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	8	16	29	46	78
	10.0	2	7	16	32	57	95	160

TABLE 4-35

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

DRAG IN SQUARE FEET		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
	5.0	1	3	7	15	27	42	71
	10.0	2	6	14	29	53	84	144

TABLE 4-36

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: 35 C

AIRCRAFT - YAH-64

DRAG IN SQUARE FEET		AIR SPEED IN KTS						
		40	60	80	100	120	140	1.0
	5.0	1	3	7	13	24	39	64
	10.0	2	6	13	27	49	79	130

TABLE 4-37

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	8	17	28	50	89
	10.0	2	7	16	33	57	101	183

TABLE 4-38

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

DRAG IN SQUARE FEET		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
	5.0	1	3	7	15	27	43	73
	10.0	2	6	15	30	53	88	147

TABLE 4-39

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: 15 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	7	14	25	39	60
	10.0	2	6	14	27	50	79	134

TABLE 4-40

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT = YAH-64

DRAG IN SQUARE FEET		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
	5.0	1	3	6	13	23	37	60
	10.0	2	5	13	25	46	73	121

TABLE 4-41

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 8000 FT   TEMPERATURE: -25 C

AIRCRAFT = YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	8	15	26	47	84
	10.0	2	6	15	31	53	94	174

TABLE 4-42

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 8000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	7	14	25	41	66
	10.0	2	6	14	28	49	83	140

TABLE 4-43

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 8000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	6	13	23	36	62
	10.0	2	5	13	26	46	73	174

TABLE 4-44

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	2	6	12	21	34	56
	10.0	2	5	12	24	43	67	113

TABLE 4-45

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	7	14	24	43	79
	10.0	2	6	14	29	49	86	162

TABLE 4-46

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT   TEMPERATURE: -5 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	6	13	23	38	64
	10.0	2	6	13	26	46	77	132

TABLE 4-47

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	6	12	21	34	57
	10.0	2	5	12	24	43	68	116

TABLE 4-48

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT TEMPERATURE: 35 C

AIRCRAFT - YAH-64

DRAG IN SQUARE FEET	AIR SPEED IN KTS 40	60	80	100	120	140	160
5.0	1	2	6	11	20	31	52
10.0	1	5	11	22	40	62	105

GROUND IDLE FUEL FLOW DATA

TABLE

TABLE 4-49

GROUND IDLE FUEL FLOW

AIRCRAFT - YAH-64

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE	-25 C	473	440	409	379	351	325
DEGREES	-5 C	492	456	424	391	365	338
CENTIGRADE	15 C	510	474	440	409	379	350
	35 C	527	490	454	422	392	362

ENTRIES ARE AIRCRAFT FUEL FLOW RATES IN LBS/HR

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GROSS WEIGHT LIMITS DATA

TABLES

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TABLE 4-50

GROSS WEIGHT LIMITS

(DUL TO ENGINE)

FOR TAKEOFF CRITERIA #1

100% OF MAXIMUM POWER (NOGF)

AIRCRAFT - YAH-64

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	21985	20471	19010	17662	16372	15185
	-5 C	21674	20575	19142	17794	16500	15241
	15 C	20289	18931	17601	16346	15106	13947
	35 C	17961	16746	15527	14357	13197	1210[illegible]

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 17,650 LBS

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TABLE 4-51

GROSS WEIGHT LIMITS

(DUE TO TRANSMISSION)

FOR TAKEOFF CRITERIA #1

100% OF MAXIMUM POWER (HOGE)

AIRCRAFT - YAH-64

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	19551	19216	18886	18538	18131	17665
	-5 C	19196	18870	18526	18125	17665	17146
	15 C	18874	18536	18143	17682	17182	16667
	35 C	18564	18181	17733	17241	16735	16194

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 17,650 LBS

TABLE 4-52

GROSS WEIGHT LIMITS

(DUE TO ENGINE)

FOR TAKEOFF CRITERIA #2

95% OF RATED POWER. VERTICAL RATE OF CLIMB 450 FT/MIN. OGE

AIRCRAFT - YAH-64

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	20219	18828	17484	16244	15058	13967
	-5 C	19979	16999	17679	16438	15243	14077
	15 C	18710	17463	16238	15082	13934	12862
	35 C	16522	15406	14263	13207	12138	11132

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 17,650 LBS

TABLE 4-53

GROSS WEIGHT LIMITS

(DUE TO TRANSMISSION)

FOR TAKEOFF CRITERIA #2

TRANSMISSION POWER LIMIT. VERTICAL RATE OF CLIMB 450 FT/MIN. OGE

AIRCRAFT - YAH-64

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	6000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	18671	18376	18072	17766	17436	17045
	-5 C	18355	18057	17758	17433	17045	16596
	15 C	18061	17766	17447	17066	16626	16159
	35 C	17769	17478	17111	16681	16220	15743

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 17,650 LBS

TABLE 4-54

GROSS WEIGHT LIMITS

(DUE TO ENGINE)

FOR TAKEOFF CRITERIA #3

100% OF MAXIMUM POWER (HIGE)

AIRCRAFT - YAH-64

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	24659	22957	21318	19803	18356	17042
	-5 C	24044	22702	21111	19615	18185	16808
	15 C	22474	20950	19473	18080	16721	15448
	35 C	20107	18739	17379	16077	14794	13587

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 17,650 LBS

TABLE 4-55

GROSS WEIGHT LIMITS

(DUE TO TRANSMISSION)

FOR TAKEOFF CRITERIA #3

100% OF MAXIMUM POWER (HIGE)

AIRCRAFT - YAH-64

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	22127	21688	21196	20623	19896	19167
	-5 C	21656	21171	20601	19883	19184	18500
	15 C	21177	20617	19912	19220	18546	17831
	35 C	20667	19976	19290	18626	17926	17190

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 17,650 LBS

VELOCITY LIMITS DATA

TABLES

TABLE 4-56

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	131	929	167	1565	166	1532	158	1331
11,500	132	953	157	1565	165	1532	157	1331
13,000	132	969	166	1565	164	1532	156	1331
14,500	132	990	163	1565	162	1532	155	1331
16,000	132	1016	161	1565	160	1532	153	1331
17,500	131	1042	159	1565	158	1532	151	1331
19,000	130	1370	157	1565	156	1532	149	1331

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TABLE 4-57

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL   TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10.000	135	923	169	1426	174	1544	163	1339
11.500	137	951	168	1426	174	1544	163	1339
13.000	138	978	167	1426	173	1544	162	1339
14.500	139	1006	163	1426	170	1544	160	1339
16.000	140	1046	162	1426	167	1544	159	1339
17.500	141	1080	160	1426	165	1544	157	1339
19.000	140	1117	158	1426	162	1544	154	1339

TABLE 4-58

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	137	912	163	1240	177	1461	170	1348
11,500	140	950	162	1240	176	1461	169	1348
13,000	141	977	161	1240	174	1461	167	1348
14,500	143	1012	159	1240	171	1461	164	1348
16,000	143	1045	157	1240	169	1461	162	1348
17,500	143	1080	155	1240	166	1461	160	1348
19,000	144	1126	153	1240	160	1461	157	1348

TABLE 4-59

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	142	921	157	1073	174	1310	177	1357
11,500	144	949	150	1073	173	1310	176	1357
13,000	145	974	152	1073	170	1310	173	1357
14,500	145	998	153	1073	168	1310	171	1357
16,000	146	1032	151	1073	166	1310	169	1357
17,500	147	1076	149	1073	160	1310	161	1357
19,000	144	1112	140	1073	161	1310	163	1357

TABLE 4-60

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	132	679	167	1456	166	1427	161	1319
11,500	132	694	166	1456	164	1427	160	1319
13,000	132	913	164	1456	163	1427	159	1319
14,500	132	938	161	1456	161	1427	157	1319
16,000	131	964	159	1456	159	1427	155	1319
17,500	130	992	157	1456	157	1427	153	1319
19,000	129	1320	155	1456	154	1427	150	1319

TABLE 4-61

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	136	870	169	1324	177	1477	169	1324
11,500	138	902	168	1324	176	1477	168	1324
13,000	138	926	165	1324	173	1477	165	1324
14,500	140	964	162	1324	170	1477	162	1324
16,000	141	998	160	1324	167	1477	160	1324
17,500	140	1034	158	1324	163	1477	158	1324
19,000	138	1061	155	1324	159	1477	155	1324

TABLE 4-62

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT = YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	139	857	163	1152	177	1365	175	1331
11,500	141	897	161	1152	175	1365	173	1331
13,000	142	927	159	1152	172	1365	170	1331
14,500	143	[illegible]	158	1152	170	1365	168	1331
16,000	143	[illegible]	156	1152	168	1365	166	1331
17,500	144	1042	153	1152	160	1365	160	1331
19,000	140	1073	47	1152	157	1365	156	1331

TABLE 4-63

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	143	870	157	998	174	1222	183	1339
11,500	145	896	155	998	171	1222	179	1339
13,000	145	920	153	998	169	1222	176	1339
14,500	146	950	151	998	167	1222	175	1339
16,000	147	992	148	998	161	1222	168	1339
17,500	145	1029	141	998	159	1222	161	1339
19,000	134	1036	131	998	148	1222	153	1339

TABLE 4-64

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	132	823	167	1350	165	1325	164	1314
11,500	132	841	165	1350	163	1325	163	1314
13,000	132	863	162	1350	161	1325	161	1314
14,500	131	890	160	1350	159	1325	159	1314
16,000	130	916	158	1350	157	1325	157	1314
17,500	129	949	155	1350	154	1325	154	1314
19,000	130	1014	152	1350	151	1325	151	1314

TABLE 4-65

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	137	823	168	1228	177	1375	173	1316
11,500	138	849	166	1228	175	1375	171	1316
13,000	139	881	162	1228	171	1375	168	1316
14,500	140	919	161	1228	168	1375	165	1316
16,000	140	954	159	1228	165	1375	162	1316
17,500	138	963	155	1228	159	1375	158	1316
19,000	134	1015	150	1228	156	1375	154	1316

TABLE 4-66

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	140	822	162	1067	177	1269	180	1319
11,500	141	849	160	1067	174	1269	177	1319
13,000	143	886	156	1067	170	1269	173	1319
14,500	143	917	156	1067	169	1269	171	1319
16,000	144	959	153	1067	161	1269	162	1319
17,500	141	995	147	1067	158	1269	159	1319
19,000	133	1024	137	1067	148	1269	150	1319

TABLE 4-67

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT   TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10.000	144	621	156	923	173	1133	187	1324
11.500	145	645	154	923	169	1133	183	1324
13.000	146	671	152	923	167	1133	181	1324
14.500	147	710	149	923	162	1133	176	1324
16.000	146	950	142	923	159	1133	159	1324
17.500	135	960	131	923	149	1133	157	1324
19.000	132	1054	116	923	139	1133	146	1324

TABLE 4-68

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	132	772	166	1253	164	1232	169	1314
11,500	132	791	163	1253	162	1232	167	1314
13,000	132	818	161	1253	160	1232	162	1314
14,500	131	843	158	1253	158	1232	160	1314
16,000	129	872	156	1253	155	1232	158	1314
17,500	130	935	152	1253	151	1232	155	1314
19,000	128	967	146	1253	145	1232	149	1314

TABLE 4-69

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	138	779	168	1139	176	1280	178	1314
11,500	138	804	163	1139	173	1280	174	1314
13,000	140	842	161	1139	169	1280	171	1314
14,500	140	877	159	1139	166	1280	168	1314
16,000	139	908	156	1139	160	1280	161	1314
17,500	134	938	151	1139	156	1280	157	1314
19,000	130	947	140	1139	147	1280	148	1314

TABLE 4-70

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10.000	141	775	161	990	175	1179	184	1314
11.500	142	807	159	990	172	1179	180	1314
13.000	143	841	157	990	169	1179	177	1314
14.500	144	879	154	990	163	1179	172	1314
16.000	142	919	149	990	159	1179	160	1314
17.500	133	942	138	990	150	1179	155	1314
19.000	130	1049	124	990	139	1179	144	1314

TABLE 4-71

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT   TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	145	774	154	852	171	1047	191	1316
11,500	145	798	152	852	168	1047	167	1316
13,000	146	831	150	852	165	1047	185	1316
14,500	147	875	144	852	159	1047	169	1316
16,000	138	895	132	852	151	1047	160	1316
17,500	132	966	117	852	139	1047	150	1316
19,000	130	1109	65	852	123	1047	141	1316

TABLE 4-72

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	132	724	165	1161	163	1142	173	1321
11,500	132	748	162	1161	161	1142	169	1321
13,000	131	774	159	1161	158	1142	166	1321
14,500	129	799	156	1161	156	1142	162	1321
16,000	130	857	153	1161	152	1142	158	1321
17,500	128	912	147	1161	146	1142	153	1321
19,000	123	966	137	1161	136	1142	144	1321

TABLE 4-73

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	138	732	166	1055	175	1187	182	1316
11,500	140	768	162	1055	170	1187	177	1316
13,000	141	802	160	1055	167	1187	174	1316
14,500	140	837	157	1055	161	1187	168	1316
16,000	135	863	152	1055	157	1187	160	1316
17,500	130	919	141	1055	148	1187	152	1316
19,000	124	1002	129	1055	137	1187	142	1316

TABLE 1-74

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	142	732	160	913	173	1089	188	1314
11,500	143	769	158	913	170	1089	184	1314
13,000	143	802	155	913	167	1089	181	1314
14,500	143	846	150	913	159	1089	166	1314
16,000	133	862	139	913	151	1089	158	1314
17,500	130	962	125	913	140	1089	148	1314
19,000	116	991	106	913	125	1089	139	1314

TABLE 4-75

VEL[illegible]TY LIMITS TA[illegible]

[illegible]NCLUDING FUEL FLOW RATES

PRESSURE: 8000 FT TEMPERATURE: 35

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE VEL (KTS)	LONG RANGE F.F. (LBS/HR)	MAX CONTINUOUS POWER VEL (KTS)	MAX CONTINUOUS POWER F.F. (LBS/HR)	MAX POWER (ENGINE) VEL (KTS)	MAX POWER (ENGINE) F.F. (LBS/HR)	TRAN[illegible]ISSION L[illegible]TS VEL (KTS)	TRAN[illegible]ISSION L[illegible]TS F.F. (LBS/HR)
10,000	145	728	152	783	168	962	196	1314
11,500	146	756	150	783	166	962	193	1314
13,000	147	799	145	783	160	962	179	1314
14,500	142	834	134	783	154	962	159	1314
16,000	132	876	119	783	140	962	155	1314
17,500	131	1022	83	783	124	962	144	1314
19,000	113	1014	0	783	105	962	134	1314

TABLE 4-76

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT   TEMPERATURE: -25 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	132	651	163	1073	162	1060	176	1341
11,500	131	707	169	1073	159	1060	172	1341
13,000	130	734	157	1073	157	1060	168	1341
14,500	129	779	154	1073	153	1060	162	1341
16,000	129	840	148	1073	147	1060	157	1341
17,500	124	869	138	1073	137	1060	148	1341
19,000	120	992	126	1073	125	1060	139	1341

TABLE 4-77

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT   TEMPERATURE: -5 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	139	693	163	972	172	1095	185	1329
11,500	140	730	160	972	168	1095	180	1329
13,000	140	766	158	972	163	1095	176	1329
14,500	136	792	153	972	158	1095	160	1329
16,000	131	844	142	972	149	1095	156	1329
17,500	124	919	130	972	138	1095	146	1329
19,000	113	964	115	972	123	1095	136	1329

TABLE 4-78

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT   TEMPERATURE: 15 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	143	696	158	837	171	1005	192	1321
11,500	143	729	155	837	168	1005	189	1321
13,000	144	772	151	837	160	1005	175	1321
14,500	135	788	141	837	154	1005	160	1321
16,000	131	873	126	837	141	1005	151	1321
17,500	117	919	105	837	126	1005	142	1321
19,000	112	1029	0	837	110	1005	129	1321

TABLE 4-79

VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: 35 C

AIRCRAFT - YAH-64

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
10,000	146	687	150	716	166	882	201	1317
11,500	147	723	146	[illegible]	161	882	195	1317
13,000	144	763	139	716	159	882	170	1317
14,500	133	788	119	716	141	882	161	1317
16,000	131	926	84	716	126	882	147	1317
17,500	113	929	0	716	106	882	138	1317
19,000	92	938	0	716	85	882	119	1317

APPENDIX A

FUNCTIONS FOR CALCULATING BASIC FUEL FLOW

There are four functions that can be used to calculate the basic fuel flow for the YAH-64 helicopter. In order to use the functions the following data is needed:

1. Flight Mode

2. Temperature

3. Pressure (altitude)

4. Gross weight

Which of the four functions will be used depends on the flight mode. The first function is for HIGE (Hover In Ground Effect).

$$FF\ (HIGE) = f\ (TEMP,\ ALT,\ GW)$$

The second function is for HOGE (Hover Out of Ground Effect).

$$FF\ (HOGE) = f\ (TEMP,\ ALT,\ GW)$$

The third function is for NOE (Nap of the Earth).

$$FF\ (NOE) = f\ (TEMP,\ ALT,\ GW)$$

The fourth function is for Forward Flight.

$$FF\ (Forward\ Flight) = f\ (AS,\ TEMP,\ ALT,\ GW)$$

The equation for FF (HIGE) is:

$$\begin{aligned} FF\ (HIGE) = {} & A\ (ALT) + B\ (TEMP) + C\ (GW) + D\ (ALT)(TEMP) \\ & + E\ (ALT)\ (GW) + F\ (TEMP)\ (GW) \\ & + G\ (ALT)(TEMP)\ (GW) + K \end{aligned}$$

Where ALT is the altitude, TEMP is the temperature and GW is the gross weight and the constants have the following values:

$A = -4.52915784 \times 10^{-2}$ $\quad$ $E = 3.3351526 \times 10^{-6}$

$B = 1.2890086$ $\quad$ $F = -1.23381615 \times 10^{-5}$

$C = 4.78281789 \times 10^{-2}$ $\quad$ $G = 4.69120325 \times 10^{-8}$

$D = -5.70888187 \times 10^{-4}$ $\quad$ $K = 2.21027534 \times 10^{2}$

The equation for FF (HOGE) is exactly the same form as FF (HIGE). A new set of values for the constants is used. These values are:

$A = -5.66156958 \times 10^{-2}$	$E = 4.27112303 \times 10^{-6}$
$B = -4.32469729 \times 10^{-1}$	$F = 1.10334622 \times 10^{-4}$
$C = 5.50694503 \times 10^{-2}$	$G = 1.54133408 \times 10^{-8}$
$D = -1.62422193 \times 10^{-4}$	$K = 2.29973969 \times 10^{2}$

The equation for FF (NOE) is once again the same as FF (HIGE). The new values for the constants are:

$A = -5.02837365 \times 10^{-2}$	$E = 3.44749702 \times 10^{-6}$
$B = -5.13175853 \times 10^{-1}$	$F = 9.31747927 \times 10^{-5}$
$C = 4.08097133 \times 10^{-2}$	$G = 2.16190963 \times 10^{-8}$
$D = -2.33548515 \times 10^{-4}$	$K = 3.32278954 \times 10^{2}$

For the Forward Flight modes the form of the equation is:

$$FF = A(AS) + B(AS^2) + C(AS^3) + D(TEMP) + E(GW) + F(ALT) + G(AS^3)(TEMP)$$
$$+ H(AS^2)(TEMP) + I(AS)(TEMP) + J(AS^3)(GW) + K(AS^2)(GW)$$
$$+ L(AS)(GW) + M(AS^3)(ALT) + N(AS^2)(ALT) + O(AS)(ALT) + P(TEMP)(GW)$$
$$+ Q(TEMP)(ALT) + R(GW)(ALT) + S(TEMP)(GW)(ALT) + T$$

Where AS is the air speed in kts and the values of the constants are:

$A = -1.64140005 \times 10$	$K = -1.92257844 \times 10^{-5}$
$B = 2.32707351 \times 10^{-1}$	$L = 1.03616714 \times 10^{-3}$
$C = -8.84023364 \times 10^{-4}$	$M = 3.13308841 \times 10^{-8}$
$D = -5.40581283 \times 10^{-1}$	$N = -7.56994245 \times 10^{-6}$
$E = 5.64757193 \times 10^{-3}$	$O = 4.91480343 \times 10^{-4}$
$F = -6.30781073 \times 10^{-2}$	$P = 1.17895909 \times 10^{-4}$
$G = -2.56489074 \times 10^{-6}$	$Q = 5.03020265 \times 10^{-5}$
$H = 4.20826211 \times 10^{-4}$	$R = 3.21928789 \times 10^{-6}$
$I = -2.99940109 \times 10^{-2}$	$S = 2.573941 \times 10^{-9}$
$J = 9.14912190 \times 10^{-8}$	$T = 8.33048630 \times 10^{2}$

These functions allow anyone with a simple calculator to figure the fuel flow of the aircraft and bypass both looking up the values and interpolating for points in between the data points in the tables.

The above equations calculate the basic fuel flow for the YAH-64 helicopter with the following accuracies:

FF (HIGE) - 96.65%

FF (HOGE) - 97.42%

FF (NOE) - 97.14%

FF (Forward Flight) - 92.57%

APPENDIX B

FUNCTION FOR CALCULATING DELTA FUEL FLOW FOR DRAG

The function below will calculate the delta fuel flow for drag for the YAH-64 helicopter. Recall from the discussion in chapter three that this value is added to the basic fuel flow value whenever drag is increasing the rate of fuel flow.*

In order to use the function the following data is needed:

1. Air Speed (AS)

2. Equivalent Square Footage of Drag (SQ)

3. Temperature (TEMP) in degrees centigrade

4. Altitude (ALT) in feet above sea level

That is:

$$FF\ (Drag) = f(AS, SQ, TEMP, ALT)$$

The equation for FF (Drag) is:

$$
\begin{aligned}
FF\ (Drag) &= A(AS) + B(AS^2) + C(AS^3) + D(TEMP) + E(SQ) + F(ALT) \\
&+ G(AS^3)(TEMP) + H(AS^2)(TEM) + I(AS)(TEMP) + J(AS^3)(SQ) + K(AS^2)(SQ) \\
&+ L(AS)(SQ) + M(AS^3)(ALT) + N(AS^2)(ALT) + O(AS)(ALT) + P(TEMP)(SQ) \\
&+ Q(TEMP)(ALT) + R(SQ)(ALT) + S(SQ)(ALT)(TEMP) + T
\end{aligned}
$$

Where the constants have the following values:

$A = 2.98456727 \times 10^{-2}$	$K = -1.99920862 \times 10^{-3}$
$B = -4.99894668 \times 10^{-4}$	$L = 1.48910522 \times 10^{-1}$
$C = 7.0723803 \times 10^{-6}$	$M = -1.98390332 \times 10^{-9}$
$D = 6.74270667 \times 10^{-1}$	$N = 2.64920097 \times 10^{-7}$
$E = -2.3219077$	$O = -1.86108518 \times 10^{-5}$
$F = 1.74824033 \times 10^{-2}$	$P = -3.38239935 \times 10^{-2}$
$G = -1.16197936 \times 10^{-6}$	$Q = 2.91575162 \times 10^{-7}$
$H = 2.61590816 \times 10^{-4}$	$R = -1.79812578 \times 10^{-4}$
$I = -1.97713673 \times 10^{-2}$	$S = 8.6047406 \times 10^{-7}$
$J = 1.12929628 \times 10^{-5}$	$T = -8.39928055$

**There is no delta fuel flow for drag for HIGE, HOGE or NOE flight.*

This equation calculates the delta fuel flow for drag value with an accuracy of 99.34%. It should be noted that in some instances the computed value will be negative. If this occurs, zero (Ø) should be used as the value for delta fuel flow.

APPENDIX C

FUNCTION FOR CALCULATING GROUND IDLE FUEL FLOW

The function below will calculate the ground idle fuel flow rate for the YAH-64 helicopter. In order to use the function the following data is needed:

1. Temperature (TEMP) in degrees centigrade.
2. Altitude (ALT) in feet above sea level.

That is:

$$FF\ (Idle) = f\ (TEMP,\ ALT)$$

The equation, for FF (Idle) is:

$$FF\ (Idle) = A(TEMP) + B(ALT) + C(TEMP)(ALT) + D(TEMP^2) + E(ALT^2) + F$$

Where the constants have the following values:

$A = 8.93869027 \times 10^{-1}$	$D = -6.24998611 \times 10^{-4}$
$B = -1.80299901 \times 10^{-2}$	$E = 2.4999909 \times 10^{-7}$
$C = -2.68571453 \times 10^{-5}$	$F = 4.96430187 \times 10^{2}$

This equation calculates the ground idle fuel flow rate with an accuracy of 99.98%.

APPENDIX D

FUNCTIONS FOR CALCULATING GROSS WEIGHT LIMITS FOR TAKEOFF

The functions given below will calculate the gross weight limits for take off for the YAH-64 helicopter. Each of the functions is of the same basic form with the values of the constants changing depending on which take off criteria is being used. In all cases the Structural Gross Weight Limit of the YAH-64 helicopter is 17,650 lbs.

In order to use the functions the following data is needed:

1. Temperature (TEMP) in degrees centigrade

2. Altitude (ALT) in feet above sea level

That is:

GW (Limit) = f (TEMP, ALT)

The basic equation for GW (Limit) is:

GW (Limit) = A(TEMP) + B(ALT) + C(TEMP)(ALT) + D

For take off criteria #1 the equation must be used twice, once using the engine limit constants and once using the transmission limit constants. For take off criteria #1 the constants for engine limits are:

$A = -6.67171421 \times 10$ $\quad$ $C = 1.49692866 \times 10^{-3}$

$B = -6.46466747 \times 10^{-1}$ $\quad$ $D = 2.07670376 \times 10^{4}$

For take off criteria #1 the constants for transmission limits are:

$A = -1.60576179 \times 10$ $\quad$ $C = -8.59643027 \times 10^{-4}$

$B = -2.08641062 \times 10^{-1}$ $\quad$ $D = 1.91961926 \times 10^{4}$

For take off criteria #2 two checks must also be made. The constants for engine limits, take off criteria #2 are:

$A = -6.13288145 \times 10$ $\quad$ $C = 1.35542954 \times 10^{-3}$

$B = -5.94784282 \times 10^{-1}$ $\quad$ $D = 1.91296797 \times 10^{4}$

For take off criteria #2 the constants for transmission limits are:

$A = -1.38092849 \times 10$ $\quad$ $C = -7.64643009 \times 10^{-4}$

$B = -1.78823207 \times 10^{-1}$ $\quad$ D = 1. [illegible]366 $\times 10^{4}$

Also for take off criteria #3 two checks must be made. The constants for engine limits, take off criteria #3 are:

$A = -7.53869057 \times 10$ $\qquad$ $C = 1.80821471 \times 10^{-3}$

$B = -7.22173177 \times 10^{-1}$ $\qquad$ $D = 2.31263032 \times 10^{4}$

For take off criteria #3 the constants for transmission limits are:

$A = -2.64504738 \times 10$ $\qquad$ $C = -8.46571842 \times 10^{-4}$

$B = -3.20595697 \times 10^{-1}$ $\qquad$ $D = 2.16187283 \times 10^{4}$

This equation with the various sets of constants gives results that are 95.29% accurate or better.

APPENDIX E

SHORT DESCRIPTION OF YAH-64 DATA SOURCE

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DRDAV-EQA(A)
SUBJECT: Short Description of YAH-64 AAH Performance Data Provided to TRADOC Systems Analysis Activity (TRASANA)

MFR:

1. References:

a. YAH-64 Systems Specification, Rev A, 23 Nov 76.

b. Determination of the Effects of Rotor Blade Compressibility on the Performance of the UH-1F; FTC-TR-65-17.

2. The performance data presented to TRANSANA is the result of combining the helicopter power required, engine power available and engine fuel flow characteristics. The YAH-64 power required was calculated for the required altitude and temperature combinations from a non-dimensional representation of engine power required (coefficient of power) v.s. gross weight (coefficient of thrust) and true airspeed (advance ratio). The non-dimensional engine power required was extracted from reference a. All performance in ground effect represents a 5 foot wheel height. A temperature dependent correction, based on the method outlined in reference b, was made to the power required to account for compressibility which could not be accounted for in the non-dimensional representation.

3. The T700-GE-700 engine power available (which was used in combination with the power required to find helicopter take off and speed limits), was calculated for the various altitude and temperature combination, by the use of the T700-GE-700 engine specification computer program.

4. The engine fuel flow at a particular altitude and temperature combination was derived from a representative referred fuel flow as a function of referred engine power. The referred fuel flow curve was constructed by use of the T700-GE-700 engine specification computer program which calculated fuel flows at various engine power levels and atmospheric conditions. The fuel flows were then corrected to reflect 5% conservatism. A referred parameter is one which is divided by temperature and pressure ratios in order to represent all atmospheric conditions by one function.

5. The never exceed speeds (V_{ne}) have not been formally established for the production YAH-64 and are, therefore, not presented at this time.

James A O'Malley Jr
JAMES A. O'MALLEY
Aero Engr

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